CTPAC-SC Proposal

SUBJECT: Align California Transportation Permits Manual with US Environmental Protective Agency (EPA) SmartWay approved and US DOT compliant new generation wide base single tire provisions.
DATE: July 31, 2008 (revised July 31, 2009)
POLICY: Transportation Permits Manual, Chapter 1, Section 106.41 and TPPM 2000-6 Super Single Tire Size

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I. OBJECTIVE

A. The new generation wide base single (NGWBS) tires have been recognized by the transport industry users, several tire manufacturers, and State and U.S. regulators to provide:

- weight savings,
- low rolling resistance,
- fuel savings, reduced greenhouse gas emissions, e.g. CO2 and NOx).
- tire/pavement contact stresses less than the original "super single" tires, and
- improved stability over the conventional dual tires.

B. Such recognition has come from the US EPA SmartWay Partnership, Department of Energy, Oak Ridge National Laboratory, National Center for Asphalt Technology (Auburn University), and the Federal Highway Administration Pavement Specialty Workshop of 2007.
Transporters have and continue to recognize the performance benefits, e.g. fuel savings, comfort, stability, and weight savings, and are updating existing equipment or ordering new equipment with these new tires.

C. The objective is to update the Transportation Permits Manual (TPM), specifically Chapter 1, General Provisions, Section 106.4.1 (13th bullet) and Chapter 3 Section 302.1 – Minimum Vehicle Size by allowing the use of the new generation wide base single (NGWBS) tires of sizes 445/50R22.5 and 455/55R22.5 at a maximum straight purple axle weight.

II. BACKGROUND

A. CALTRANS Transportation Permits Manual (TPM) - Chapter 1 General Provisions section 106.4.1 (dated 2/23/90) 13th bullet states that for permit-required operation:

> "The maximum axle width measured from the extreme width of the axle or tire on the left side to the extreme width of the axle or tire of the same axle on the right side if extra legal weight is required. Do not measure loaded induced tire bulge. Actual measurements are required. Do not "round-off". Axle width shall be a minimum of 96 inches to qualify for extralegal weight except that dollies used in

beam and dolly operations may be allowed a proportionate amount of straight purple chart weight.

Eight tired axles shall be a minimum of 96 inches wide in order to qualify for the 15 percent bonus and 120 inches wide to qualify for the 25 percent bonus. All tires per axle must be of equal size. Tires must have capacity for the weight requested.

If the 96" axle width minimum is not measured, the permit is rejected during the CALTRANS heavy haul inspection."

B. New Generation Wide-Base Single (NGWBS) – single tires designed to replace dual tire sets on the tractor drive and/or trailer positions.

- They were designed to be interchangeable with the dual tires without any change to the vehicle.

- The NGWBS tires replaces the conventional dual tire assemblies of sizes as follows:
  1. 445/50R22.5 tire replaces the conventional dual tire sizes 275/80R22.5 or 295/75R22.5.
  2. 455/55R22.5 tire replaces the conventional dual tire sizes 11R22.5 or 275/80R24.5 .
  3. Michelin, Bridgestone, Continental and Goodyear offer the 445/50R22.5 size while Michelin also offers the 455/55R22.5 size of these new tires

- The NGWBS tire technology is intended for use on commercial vehicles as classified by the Federal Highway Administration Section 383.91, e.g. Groups A, B, and C.

- The NGWBS tire technology is vastly different than the earlier generation "Super Single" tires that are designed for the on-off road use versus the highways and roads used for commercial purposes.
  1. The 445/50R22.5 and 455/55R22.5 NGWBS tires differ from the "Super Single" tires that are commonly sized as 385, 435, or 445/65R22.5, i.e. 65-series.

- NGWBS wider footprints/tread widths versus the "Super Singles" provide for essentially equivalent tire/pavement contact stresses when compared to the conventional dual tire assembly.

- The track width of the NGWBS tire-fitted vehicle is wider (when a 1.13" or 2"outset wheel is used) than an axle fitted with conventional dual tires, therefore, improving stability and handling, and improving upon the track width of conventional dual tire-fitted axles.

1. e.g. NGWBS tire-fitted 71.5" axle (on 2" outset wheels) track width = 74.5" v dual tire-fitted axle track width = 72.5".
2. e.g. NGWBS tire-fitted 77.5" axle track(on 2" outset wheels) width = 80.5"" v dual tire-fitted axle track width = 77.5".
3. Track width of a vehicle is defined in SAE J1100 "Motor Vehicle Dimensions" as the lateral distance between the centers of the wheels, measured along the spindle, or axle axis.
4. If there are dual rear wheels, measure from the midway points between the inner and outer tires.
5. The alternate method and ease of measurement of track width for tire-fitted axles is measured from the outside tread edge of the outer tire on the left side of the axle assembly to the inside tread edge of the inner tire of the same axle assembly on the right side.

- Improved tire maintenance, e.g. inflation pressure measurement, of the single tire versus the difficulties of maintaining the inner tire of a conventional dual tire assembly provides safer tire operation and vehicle safety.
  1. Differences between the outer and inner tire of a conventional dual tire assembly create a potential tire performance issue for both tires, as well as increasing the tire/pavement contact stresses by virtue of tire pressure differences.

- The potential benefits of the NGWBS tire technology include improved fuel economy, reduced greenhouse gas emissions, reduced un-sprung weight (~800 lbs/ five axle combination vehicle) which helps improve handling, lower operational cost, reduced maintenance and improved safety due to improved ride and handling in all weather conditions.

- A 2007 Federal Highway Administration International "Wide Base Tire" specialty pavement workshop had representation from academia, government agencies, tire industry, and end users represented by ATA. The attendees generally accepted that the NGWBS tires are close to if not equal to standard duals in pavement damage. They equally felt that the NGWBS tires merited an effort of support due to their environmental benefits.

- A U.S. EPA SmartWay study published by SAE in 2005 showed a reduction in fuel use of 6% at 55 mph, 12% at 65 mph and 10% in a suburban loop. The NOx reductions were 36%, 30% and 13%, respectively.
  1. A second SmartWay study published by SAE in 2007 supported the tire contributions to fuel savings and NO_x emission reduction.

III. EXISTING DOCUMENTATION

A. Transportation Permits Manual - Section 106.4.1 (Bullet #13) of the TPM states the following:

"The maximum axle width measured from the extreme width of the axle or tire on the left side to the extreme width of the axle or tire of the same axle on the right side if extra legal weight is required. Do not measure loaded induced tire bulge. Actual measurements are required. Do not "round-off". Axle width shall be a minimum of 96 inches to qualify for extralegal weight except that dollies used in beam and dolly operations may be allowed a proportionate amount of straight purple chart weight.

Eight tired axles shall be a minimum of 96 inches wide in order to qualify for the 15 percent bonus and 120 inches wide to qualify for the 25 percent bonus. All tires per axle must be of equal size. Tires must have capacity for the weight requested."

B. California Vehicle Code (CVC)

- No references to minimum axle width on permit-required commercial motor vehicles found in the California Vehicle Code.

C. CALTRANS TPPM 2000-6

- TPPM-2000-6 dated July 3, 2000 CALTRANS Transportation Permits Policy Memorandum states the following:

  "Chapter 3 Section 302.1 – Minimum Vehicle Size:
  Super single tires of a minimum size of 18" x 19.5" are an acceptable substitute for dual tires. The metric equivalent cross section width of 445 mm is also acceptable. Tires marked by the manufacturer with a 17.5"cross section width will be treated as 18" tires."

IV. CURRENT PRACTICE

A. The current practice of the CALTRANS Transportation Permits Manual Chapter 1 Section 106.4.1 requires a minimum axle width of 96 inches to qualify for extralegal weight except that dollies used in beam and dolly operations may be allowed a proportionate amount of straight purple chart weight.

B. Axle width in the TPM is measured from the extreme width of the axle or tire on the left side to the extreme width of the axle or tire of the same axle on the right side if extra legal weight is required.

C. If the 96" axle width minimum is not measured, the permit is rejected during a CALTRANS heavy haul inspection.

V. PROPOSED CHANGES

A. Transportation Permit Manual

- This proposal seeks to change Chapter 1 Section 104.6.1 regarding minimum axle width for new generation wide base single (NGWBS) tires for permit operation and Chapter 3 Section 302.1 of the Transportation Permit Manual for optional tire sizes for single tire extralegal weight applications.

- Existing Section 106.4.1:

  "The maximum axle width is measured from the extreme width of the axle or tire on the left side to the extreme width of the axle or tire of the same axle on the right side if extra legal weight is required. Do not measure loaded induced tire bulge. Actual measurements are required. Do not "round-off". Axle width shall be a minimum of 96 inches to qualify for extralegal weight except that dollies used in beam and dolly operations may be allowed a proportionate amount of straight purple chart weight.

  Eight tired axles shall be a minimum of 96 inches wide in order to qualify for the 15 percent bonus and 120 inches wide to qualify for the 25 percent bonus. All tires per axle must be of equal size. Tires must have capacity for the weight requested."

- **Proposed revision to Section 106.4.1**

  "The maximum axle width <u>for the conventional 4 tired axle</u> is measured from the extreme width of the axle or tire on the left side to the extreme width of the axle or tire of the same axle on the right side if extra legal weight is required. Do not measure load induced tire bulge. Actual measurements are required. Do not "round-off". Axle width shall be a minimum of 96 inches to qualify for extralegal weight except that dollies used in beam and dolly operations may be allowed a proportionate amount of straight purple chart weight.

  <u>Conventional</u> eight tired axles shall be a minimum of 96 inches wide in order to qualify for the 15 percent bonus and 120 inches wide to qualify for the 25 percent bonus. All tires per axle must be of equal size. Tires must have capacity for the weight requested.

  <u>New generation wide base single tires (445/50R22.5 and 455/55R22.5) of a minimum section width of 17 inches are an acceptable substitute for dual tires.</u>
  <u>Two vehicle combinations consisting of a 3 or 4 axle power unit and a 2 or 3 axle semi-trailer equipped with the new generation wide base single tires with a minimum track width of not less than that of a conventional dual tire-fitted axle, i.e. 72" may be authorized non-bonus purple weight.</u>

Track width is measured from the outside tread edge of the single tire on the left side of the axle assembly to the inside tread edge of the single tire of the same axle assembly on the right side.

Cranes equipped with single tires of the metric size marked 445 mm or 18" x 19.5" are acceptable. Crane tires marked by the manufacturer with a 17.5" cross section width will be treated as 18" tires."

- Existing Section 302.1 Minimum Vehicle Size

  "In order to qualify for extralegal weight, the minimum hauling configuration shall consist of a two vehicle combination, including a three (3) axle tractor and a two (2) axle semitrailer with a 5th wheel connection.

  The vehicle shall be equipped with dual tires on all axles except the steering axle. Super single tires of a minimum size of 18" x 19.5" are an acceptable substitute for dual tires. The metric equivalent cross section width of 445mm is also acceptable. Tires marked by the manufacturer with a 17.5" cross section width will be treated as 18" tires.

  Extra legal weight is not authorized on a single axle unless that axle is a front steering axle or is used in combination with adjacent axles to make one common suspended axle group.

  Extralegal weight is authorized on a single vehicle only when that vehicle is a fixed load vehicle and the equipment mounted on that vehicle is used to perform a single job site function."

- **Proposed revision to Section 302.1 Minimum Vehicle Size**

  "In order to qualify for extralegal weight, the minimum hauling configuration shall consist of a two vehicle combination, including a three (3) axle tractor and a two (2) axle semi-trailer with a 5th wheel connection.

  The vehicle shall be equipped with dual tires on all axles except the steering axle. New generation wide base single tires (445/50R22.5 and 455/55R22.5) of a minimum section width of 17 inches are an acceptable substitute for dual tires.

  Cranes may be equipped with single tires or metric equivalent of a minimum size marked 445 mm or 18" x 19.5" are an acceptable substitute for dual tires. Crane tires marked by the manufacturer with a 17.5" cross section width will be treated as 18" tires.

Extra legal weight is not authorized on a single axle unless that axle is a front steering axle or is used in combination with adjacent axles to make one common suspended axle group.

Extralegal weight is authorized on a single vehicle only when that vehicle is a fixed load vehicle and the equipment mounted on that vehicle is used to perform any related job site function."

VI. BENEFITS/IMPACT/JUSTIFICATION

A. See the "Background" above.

B. The use of the NGWBS tires on the 2" or 1.13"outset wheels results in a wider track width (the lateral distance between the centers of the wheels, measured along the spindle, or axle axis) of the vehicle than an axle fitted with conventional dual tires, therefore, improving vehicle stability.

C. In addition, the pending California Air Resource Board (CARB) requirements under California AB32 Global Warming Solutions Act of 2006 includes the use of fuel efficient tires such as the NGWBS tires that are approved by the U.S. EPA SmartWay program.

   The current CALTRANS TPM Chapter 1 Section 106.4.1 would reject the permits for those vehicles using such NGWBS tires for compliance to the AB32 requirements.

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